Genesis HIGH SPEED

User Manual

English

6600 Isolated Digitizer

GEN series

HBM

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1 Safety Messages

1.1 FCC and general

The first WARNING note below is required by the FCC and relates only to the interference potential of this equipment. This message is a direct quotation.

WARNING

The equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation, it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart B or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This manual contains information and warnings that must be observed to keep the instrument in a safe condition. The instrument should not be switched on if it is damaged and it should not be used under wet conditions.

For the correct and safe use of this instrument it is essential that both operating and service personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

Whenever it is likely that safety protection has been impaired, the instrument must be made inoperative and secured against any unintended operation. Qualified maintenance or repair personnel should be informed. Safety protection is likely to be impaired if, for example, the instrument shows visible damage or fails to operate normally.

This instrument must not be used in life support roles.

For protection against electric shock, all external circuits or equipment shall have a safe insulation. Therefore it is not permitted to connect peripheral equipment to the system with a power supply without SELV (Separated Extra Low Voltage) or Class II qualification.

The international standard for test equipment safety is IEC 61010-1 (formerly IEC 1010-1). It defines four overvoltage categories (CAT I, CAT II, CAT III, and CAT IV), sometimes called installation or location categories, based on the magnitude of danger from transient impulses.

WARNING

All inputs are rated for CAT II (Category 2) signals only. This instrument should not be used to measure high-energy signals of Categories III and IV.

The covers protect the user from live parts and should only be removed by suitably qualified personnel for maintenance and repair purposes.

The instrument must not be operated with the covers removed.

There are no user serviceable parts inside.

1.2 Protection

WARNING

Do not remove covers. Refer servicing to qualified individuals.

Proper use of this device depends on careful reading of all instructions and labels.

If the instrument is used in a manner not specified by HBM, the protection provided by the instrument can be impaired.

WARNING

This instrument must not be operated in explosive atmospheres.

WARNING

This instrument and related accessories are not designed for biomedical experimentation on humans and should not be directly connected to human subjects or used for patient monitoring.

1.3 Power and frequency requirements

The 6600 Isolated Digitizer HV model is battery powered. Refer to "Batteries" on page 15 for more information.

The 6600 Isolated Digitizer MV model uses up to 12 VA and operates from line voltages of 115 Vac or 230 Vac at 47-63 Hz.

The power connection of the MV model is via a standard IEC 320 EN 60320 C14 (male) appliance inlet, 2-pole, 3-wire designed for 250 V @ 10A. Access to the AC supply fuse(s) and voltage selector can only be made if the AC supply connector is removed. A 250 mA fuse must always be used. Refer to "Fuse requirements and protection" on page 11 for details.

To disconnect the instrument from the AC supply, unplug the IEC connector on the rear of the instrument. The instrument should be positioned to allow access to the AC connector. The front power switch on the instrument is not a disconnecting device. When the instrument is connected some power will be consumed

CAUTION

Do not position this instrument so that it is difficult to remove the power input cable.

The MV model must be used with a ground connected via the conductor of the supply cable. This is to ensure all Electro Magnetic Compatibility (EMC) requirements are met.

IMPORTANT

The instrument (HV and MV model) is NOT connected to a protective ground.

1.4 Fuse requirements and protection

The 6600 MV model is equipped with a replaceable fuse. The fuse arrangement stated here must be followed and, additionally, in the UK a fuse should be fitted in the line supply plug.

The fuse must be a slow blow (T) fuse with a rating of 250 mA.

WARNING

ELECTRICAL SHOCK HAZARD!
Any interruption of the protective conductor inside or outside the apparatus is likely to make the apparatus dangerous. Intentional interruption is prohibited.
When the apparatus is connected to its supply, terminals may be live, and the opening of covers for removal of parts is likely to expose live parts.

Whenever it is likely that the protection has been impaired, the apparatus shall be made inoperative and be secured against any unintended operation.

The protection is likely to be impaired if, for example, the apparatus shows visible damage or has been subjected to severe transport stresses.

It is the responsibility of the user to ensure the safety of any accessories, such as probes, used with the instrument.

WARNING

ELECTRICAL SHOCK HAZARD! Do not remove covers. Refer servicing to qualified individuals.

Proper use of this device depends on careful reading of all instructions and labels.

If the instrument is used in a manner not specified by HBM, the protection provided by the instrument can be impaired.

WARNING

This instrument must not be operated in explosive atmospheres.

WARNING

This instrument and related accessories are not designed for biomedical experimentation on humans and should not be directly connected to human subjects or used for patient monitoring.

1.5 Overvoltage and current protection, isolation

All signal inputs are protected against overloads of 250 Vpk (125 Vpk for lower ranges, see specifications) continuously and 800 V transient (impulse spark-over voltage). Exceeding these limits, particularly when connected to potentially high-current sources, can cause severe damage that is not covered by the manufacturer's warranty.

In addition the 6600 Isolated Digitizer inputs have an isolation of 500 Vpk. Creepage and clearance distances within the instrument are tested for the complete range of 500 + 250 Vpk.

WARNING

For connection of a signal to the isolated BNC input of the instrument use isolated BNC connectors only.

The 6600 Isolated Digitizers are designed to be used in combination with the GEN series Data Acquisition System. The fiber optic cables determine the maximum clearance distance and creepage distance between the Isolated Digitizer and the Acquisition System.

WARNING

The minimum clearance and creepage distance depend on the position of the Isolated Digitizer and the Acquisition System during operation. A safety factor of at least 2 times of the creepage and clearance distance is required.

1.6 Environment

The instrument should be operated in a clean, dry environment with an ambient temperature of between 0 ˚C and +40 ˚C for the MV Model or –15 ˚C and +50 ˚C for the HV Model.

The instrument is specified for use in a Pollution Category II environment, which is normally nonconductive with temporary light condensation, but it must not be operated while condensation is present. It should not be used in more hostile, dusty or wet conditions.

The instrument will operate with full, specified accuracy between +15 ˚C and +35 ˚C.

Note *Direct sunlight, radiators and other heat sources should be taken into account when assessing the ambient temperature.*

The instrument relies on a convection air-cooling design that does not require a fan. Adequate cooling can usually be achieved by leaving a 12.5 mm (0.5" gap) around the instrument.

Do not store the instrument in hot areas. High temperatures can shorten the life of electronic devices and damage batteries.

Do not store the instrument in cold areas. When the instrument warms up to its normal operating temperature, moisture can form inside the instrument, which may damage the instrument's electronic circuit boards.

Do not drop, knock or shake the instrument. Rough handling can break internal circuit boards.

Do not use harsh chemicals, cleaning solvents or strong detergents to clean the instrument. To clean the instrument, disconnect all power sources and wipe the surfaces lightly with a clean, soft cloth dampened in a mild soap-and-water solution.

It is the responsibility of the user to ensure the safety of any accessories, such as probes, used with the instrument.

1.7 Batteries

The 6600 Isolated Digitizer HV model operates on removable, rechargeable Lithium-Ion (Li-ion) batteries. The MV model has internal rechargeable Ni-MH batteries that are not serviceable.

Precautions and warnings when using batteries

- Never use any charger or battery that is damaged in any way.
- Use the battery only for its intended purpose.
- Do not take batteries apart or modify them. The batteries may not be damaged, crushed, pierced or exposed to high temperatures. In case of inappropriate handling of a battery there could be a risk of combustion or explosion.
- Battery charging time depends on the remaining battery charge and the type of battery and charger used. The batteries can be charged and discharged hundreds of time, but will gradually wear out. When the operation time is noticeable shorter than normal, it is time to buy new batteries.
- If left unused, a fully charged battery will discharge itself over time.
- Use only HBM approved batteries and recharge your batteries only with HBM approved chargers. When a charger is not in use, disconnect it from the power source. Do not leave a battery connected to a charger for more than a week, since overcharging may shorten its life.
- Extreme temperatures will affect the charging capacity of the battery: it may require cooling or warming first.
- HV Model: Remove the batteries before charging.
- Do not leave the batteries in hot or cold places, as you will reduce the capacity and lifetime of the batteries. Always try to keep batteries at room temperature. An instrument with hot or cold batteries may temporarily not work, even when the batteries are fully charged.
- Standard Li-ion batteries cannot be charged below 0 °C (32 °F). Although the packs appear to be charging normally they will be damaged. If done repeatedly, such damage can compromise the safety of the pack. The battery will become more vulnerable to failure if subjected to impact, crush or high rate charging.
- Do not short-circuit the battery. Accidental short-circuit can occur when a metallic object causes a direct connection between the + (plus) and - (minus) terminals of the battery, for example when you carry a spare battery in a pocket or bag. Short-circuiting the terminals may damage the battery or the object causing the short-circuiting.
- Dispose of used batteries in accordance with local chemical waste regulations only. Always recycle. Do not dispose of batteries in a fire.

WARNING

For protection against electric shock the HV model may not be operated without both battery modules installed.
Make sure that input signals are detached from the instrument before a battery module is being removed.

WARNING

If leaked battery fluid comes into contact with your eyes, immediately flush your eyes with water and consult a doctor, as it may result in blindness or other injury. If leaked battery fluid comes in contact with your body or hands, wash thoroughly with water.
If leaked battery fluid comes into contact with the instrument, carefully wipe the instrument, avoiding direct contact with your hands.

1.8 Electromagnetic compatibility (EMC)

EMC stands for Electro-Magnetic Compatibility. The overall intention is that electronic equipment must be able to co-exist with other electronic equipment in its immediate vicinity and neither emits large amounts of electromagnetic energy. Thus there are two distinct requirements for electromagnetic compatibility: Emission and Immunity.

This instrument generates, accepts and can radiate radio frequency energy and, if not installed and used in accordance with the operator manual, may cause harmful interference to other equipment. However, there is no guarantee that interference will not occur in a particular installation.

Immunity test: All immunity tests are done with the failure criterion being a change of the instrument's control settings. Any of these tests may produce a spurious trigger. Measurements are not valid during and immediately after the immunity tests.

In demanding applications, if this instrument does cause minor harmful interference to other equipment, which can be determined by turning this instrument off and on, the user is encouraged to try to reduce the interference by one or more of the following measures:

- Re-orient or relocate the affected equipment.
- Increase the separation between the instrument and the affected equipment.
- Re-orient or relocate interface cables.
- Connect the instrument to an outlet on a different supply circuit to the affected equipment.

Supply cables, interface cables and probes should be kept as short as practical, preferably a maximum of 1 m. Interface cables should be screened and interface cables longer than 3 m are not acceptable in terms of interference port immunity.

1.9 Electro Static Discharge (ESD)

Electrostatic discharge (ESD) can cause damage to electronic devices if discharged into the device, so you should take steps to avoid such an occurrence.

CAUTION

HBM uses state-of-the-art electronic components in its equipment. These electronic components can be damaged by discharge of static electricity (ESD). ESD damage is quite easy to induce, often hard to detect, and always costly. Therefore we must emphasize on the importance of ESD preventions when handling a GEN series system, its connections or a plug-in card.

Description of ESD

Static electricity is an electrical charge caused by the buildup of excess electrons on the surface of a material. To most people, static electricity and ESD are nothing more than annoyances. For example, after walking over a carpet while scuffing your feet, building up electrons on your body, you may get a shock - a discharge event - when you touch a metal doorknob. This little shock discharges the built-up static electricity.

ESD-susceptible equipment

Even a small amount of ESD can harm circuitry, so when working with electronic devices, take measures to help protect your electronic devices, including your GEN series Data Acquisition System, from ESD harm. Although HBM has built protections against ESD into its products, ESD unfortunately exists and, unless neutralized, could build up to levels that could harm your equipment. Any electronic device that contains an external entry point for plugging in anything from cables to acquisition cards is susceptible to entry of ESD.

Precautions against ESD

Make sure to discharge any built-up static electricity from yourself and your electronic devices before touching an electronic device, before connecting one device to another, or replacing acquisition cards. You can do this in many ways, including the following:

- Ground yourself by touching a metal surface that is at earth ground. For example, if your computer has a metal case and is plugged into a standard three-prong grounded outlet, touching the case should discharge the ESD on your body.
- Increase the relative humidity of your environment.
- Install ESD-specific prevention items, such as grounding mats and wrist straps.

While you should always take appropriate precautions to discharge static electricity, if you are in an environment where you notice ESD events, you may want to take extra precautions to protect your electronic equipment against ESD.

The use of wrist straps

Use an ESD wrist strap whenever you open a chassis, particularly when you will be handling circuit cards and appliques. In order to work properly, the wrist strap must make good contact at both ends (with your skin at one end, and with the chassis at the other).

WARNING

The wrist strap is intended for static control only. It will not reduce or increase your risk of receiving an electric shock from electrical equipment. Follow the same precautions you would use without a wrist strap.

1.10 Laser safety

The system is classified as a Class 1 laser product. The 6600 Isolated Digitizer uses an LC optical transceiver for data and command communication between 6600 Isolated Digitizer Receiver and Transmitter. It does not emit hazardous light but it is recommended to avoid direct exposure to the beam.

The built-in laser complies with laser product standards set by government agencies for Class 1 laser products:

- In the USA, the 6600 Isolated Digitizer is certified as a Class 1 laser product conforming to the requirements contained in the Department of Health and Human Services (DHHS) regulation CDRH 21 CFR, Chapter I Subchapter J Part 1040.10.
- Outside the USA, the 6600 Isolated Digitizer is certified as a Class 1 laser product conforming to the requirements contained in IEC/EN 60825-1:1994+A1+A2 and IEC/EN 60825-2.

1.11 Instrument symbols

On the system a variety of symbols can be found. Below is a list of symbols and their meaning.

This symbol is used to denote the measurement ground connection. This point is not a safety ground.

This symbol is used to denote a safety ground connection.

Where caution is required, this symbol refers to the User's Guide for further information.

This symbol warns that high voltages are present close to this symbol.

This symbol shows that the switch is a standby switch. When it is pressed, the instrument state toggles between operating and stand by mode. In standby mode some power will be consumed and the instrument is NOT disconnected from the AC supply.

1.12 Manual handling of loads

The Manual Handling of Loads Directive 90/269/ EEC from the European Community lays down the minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury.

Before lifting or carrying a heavy object, ask yourself the following questions:

- Can you lift this load safely, or is it a two-person lift?
- How far will you have to carry the load?
- Is the path clear of clutter, cords, slippery areas, overhangs, stairs, curbs or uneven surfaces?
- Will you encounter closed doors that need to be opened?
- Once the load is lifted, will it block your view?

- Can the load be broken down into smaller parts?
- Should you wear gloves to get a better grip and protect your hands?

Contact the “Occupational Health and Safety” organization, or equivalent, in your country for more information.

The 6600 Isolated Digitizer models weigh approximately 4 kg maximum:

1.13 International safety warnings

Danish

SIKKERHEDSADVARSEL
Dćkslerne mÍ ikke fjernes.

Hvis netsikringen springer som fřlge af en fejl, er det muligt at instrumentets AC netafbryder er blevet beskadiget, hvorfor den břr efterses af en kvalificeret tekniker.

Afbryd instrumentet fra lysnettet ved at fjerne IEC stikket fra bagpanelet. Dette instruments AC netafbryder er kun beregnet til funktionelle formÍl. Den er hverken beregnet til eller egnet til afbrydelse af lysnettet.

Nederlands

VEILIGHEIDSWAARSCHUWING
De deksels nooit verwijderen.

Als de zekering doorbrandt als gevolg van een storing of een defect, dan is het mogelijk dat de wisselstroom-voedingsschakelaar van het instrument beschadigd is. Die schakelaar moet worden gecontroleerd door een deskundig technicus.

Als de IEC-aansluiting op het achterpaneel uit het stopcontact wordt verwijderd, zal het instrument niet langer zijn aangesloten op de wisselstroomvoeding. De wisselstroom-voedingsschakelaar op dit instrument is uitsluitend bestemd voor functionele doeleinden. Die schakelaar mag nooit worden gebruikt om het instrument aan of af te zetten.

Suomi

TURVAOHJEITA
Älä poista suojakansia.

Mikäli laitteen verkkosulake palaa vian seurauksena, on mahdollista, että laitteen verkkokytkin on vaurioitunut ja se tulee tällöin tarkastuttaa ammattihenkilöllä.

Erottaaksesi tämän laitteen käyttöjännitteestä irrota takapaneelissa oleva IEC-liitin. Tämän laitteen verkkokytkimellä on ainoastaan toiminnallinen tarkoitus. Sitä ei ole tarkoitettu, eikä se sovellu laitteen erottamiseen käyttöjännitteestä.

Français

ATTENTION - DANGER!
Ne pas déposer les panneaux de protection.

Le fait que le fusible d'alimentation saute par suite d'une anomalie risque de détériorer l'alimentation secteur de l'instrument; dans ce cas, le faire contrôler par un technicien qualifié.

Pour couper l'alimentation secteur de cet instrument, débrancher le cordon secteur monté ŕ l'arričre. L'interrupteur d'alimentation est purement secteur fonctionnel. Il ne s'agit pas d'un dispositif de coupure du courant, et n'est pas conçu pour cette fonction.

Deutsch

WARNHINWEIS!
Die Schutzabdeckung nicht entfernen.

Wenn die Sicherung der Versorgung infolge eines Defektes durchbrennt, besteht die Möglichkeit einer Beschädigung des Wechselstromversorgungs-Schalters des Gerätes. Der Schalter muß dann von einem qualifizierten Elektriker geprüft werden.

Zum Trennen des Gerätes von der Wechselstromversorgung den IEC-Stecker von der Rückwand abziehen. Der Wechselstromversorgungs-Schalter dient bei diesem Gerät nur für Funktionszwecke. Er ist nicht als Trennvorrichtung bestimmt bzw. geeignet!

Italiano

AVVISO DI SICUREZZA
Non aprire lo strumento.

Nel caso in cui il fusibile dell'alimentazione dovesse scattare a causa di un guasto, č possibile che l'interruttore dell'alimentazione a corrente alternata dello strumento possa essere danneggiato e dovrŕ pertanto essere controllato da un tecnico specializzato e qualificato.

Per disinnestare questo strumento dall'alimentazione a corrente alternata, levare il connettore IEC che si trova sul pannello posteriore. L'interruttore dell'alimentazione a corrente alternata di questo strumento viene fornito esclusivamente per scopi operativi e non viene inteso, né č adatto, per essere utilizzato come dispositivo di disinnesto.

Norsk

ADVARSEL!
Ikke fjern dekslene

Hvis sikringen springer pĺ grunn av feil som oppstĺr, er det mulig at instrumentets vekselstrřmbryter kan bli skadet - den mĺ derfor kontrolleres av en kvalifisert ingeniřr.

Skal instrumentet koples fra vekselstrřmtilfřrselen, kopler man ut IEC koplingen bak pĺ panelet. Vekselstrřmbryteren pĺ dette instrumente tjener kun en funksjonell hensikt. Den er ikke egnet, og mĺ ikke brukes, som skillebryter.

Portugęs

Aviso de segurança
Năo retire o invólucro/capas.

Se o fusîvel suplementar queimar por causa de erro, é possivel que o interruptor da fonte AC do aparelho esteja com defeito e deveria ser checado por pessoa autorizada.

Para desconectar este aparelho da fonte AC, retire o conector IEC do painel trazeiro. Neste aparelho, o interruptor da fonte AC existe sómente por razőes funcionais. Năo deve ser usado e nem é apropriado como dispositivo de desconexăo.

Español

ADVERTENCIA SOBRE SEGURIDAD
No quite las tapas.

Si se fundiera el fusible de alimentación como consecuencia de una avería, cabe la posibilidad de que el interruptor de encendido del equipo esté dañado y sea necesario comprobarlo por personal técnico especializado y autorizado al efecto.

Para desconectar este instrumento de la red, desenchufe el conector IEC del panel trasero. El interruptor de entrada de CA (encendido) se incluye solo para fines funcionales. No está pensado para utilizarse como medio de desconexión, ni tampoco es adecuado para ello.

Svenska

SÄKERHETSVARNING
Tag ej bort skydden.

Om matarsäkringen smälter pĺ grund av ett fel är det möjligt att strömställaren för växelströmsmatning pĺ instrumentet skadas och den bör dĺ inspekteras av en ingenjör med lämpliga kvalifikationer.

För att koppla bort instrumentet frĺn växelströmstillförseln, tag ut IEC-anslutningen pĺ bakpanelen. Strömställaren för växelströmstillförsel pĺ detta instrument är enbart till för funktionerliga ändamĺl. Den är inte avsedd som, eller lämplig som, en bortkopplingsanordning.

English

SAFETY WARNING
Do not remove the covers.

If the supply fuse blows as the result of a fault, it is possible that the instrument's AC supply switch will be damaged and should be checked by a suitably qualified engineer.

To disconnect this instrument from the AC supply, unplug the IEC connector on the rear panel. The AC supply switch on this instrument is provided for functional purposes only. It is not intended as, or suitable as, a disconnecting device.

日本語

安全上の警告
カバーは取り外さないでください。

電源ヒューズが故障により飛んだ場合、機器の AC 電 源スイッチが損傷するおそれがあるため、然るべき認 定を受けた適任者による点検を受けてください。

本機器を AC 電源から遮断するには、背面パネルにあ る IEC コネクターを抜きます。 本機器の AC 電源ス イッチは、機能上の目的のためだけに提供していま す。 したがって、機器の主電源遮断用として意図さ れていないか、適応していません。

中文

安全警告
不要取下保护盖。

如果电源保险丝因故障而熔断，则有可能损坏仪器的 交流电源开关并应由具备资格的工程师检查。

拔下仪器后面板上的 IEC 接头即可断开交流电源。 仪器上的交流电源开关仅用于功能性目的。 而不是 用于或适用于断开设备。

1.14 Declaration of conformity

For information about the EC Declaration refer to: www.hbm.com/highspeed.

2 About this manual

2.1 Symbols used in this manual

The following symbols are used throughout this manual to indicate warnings and cautions.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

WARNING

Indicates an electrical shock hazard which, if not avoided, could result in death or serious injury.

WARNING

Indicates a risk of fire which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or alerts against unsafe practices; or alerts against actions which could damage the product, or result in loss of data.

CAUTION

The ESD Susceptibility Symbol indicates that handling or use of an item may result in damage from ESD if proper precautions are not taken.

HINT/TIP

The info icon indicates sections which give additional information about the product. This information is not essential for correct operation of the instrument, but provides knowledge to make better use of the instrument.

3 Introduction

3.1 Introducing the Isolated Digitizer

Welcome. You have made the right choice: the 6600 Isolated Digitizer is the fourth generation of fiber-optic isolated digitizers designed by HBM. Smaller, less weight and improved performance compared to its predecessors make the 6600 Isolated Digitizer the leading product for use in the most demanding test lab applications. The digitizer is designed for applications that require high voltage isolation and safe and accurate measurements in harsh electrical environments.

Successful operation of any laboratory, whether independent or manufacturer owned, rely on disturbance free and accurate measurements, also when the object under test has a failure: high frequency oscillating currents flow to earth and cause a high potential shift of the earth point up to many kilovolts. The resulting problems of earthing and power supply connection are less when galvanic isolation from the test area is achieved by means of fiber-optic links.

There are two principal ways of transmitting signals via fiber-optic links: analog or digital. With a digital link the measured signal is digitized with an A-to-D Convertor close to the test object, transmitted via the fiber, and processed directly in digital form. Digital fiber-optic systems do not have drift or noise problems and surpass their analog counterparts when it comes to dynamic accuracy.

Bringing the A-to-D Convertors close to the test object, however, means that extra care must be taken to shield the equipment from strong electro-magnetic fields. The power for the A-to-D Convertors must be supplied from batteries to avoid any coupling with the environment.

In close cooperation with leading European high power laboratories, HBM has developed the 6600 Isolated Digitizer model, a fiber-optic isolated digitizing subsystem with digital link, designed to meet the demands of high power and high voltage measurements.

The 6600 Isolated Digitizer eliminates the use of floating scopes, protecting both operator and instrument even where high voltage and high EMI are involved. The 6600 Isolated Digitizer offers remote operation, excellent signal fidelity and elimination of ground problems.

Features and advantages

- Complete single-channel isolated analog input subsystem
- Rugged enclosure for use in EMI hostile environments
- Digital fiber-optic data transmission for excellent DC stability

- Wide dynamic range and unsurpassed dynamic accuracy
- Up to 100 MegaSample/s sample rate at 14-bit resolution
- Combines with GEN series 4-channel receiver board with 400 MegaSample on-board memory

3.1.1 Available models and configurations

The 6600 Isolated Digitizer is available in four different configurations. There are two mechanical variants, one for use in medium and one for use in high voltage environments. Each model is available with 25 MS/s or 100 MS/s digitizing speed per channel.

The **Medium Voltage (MV)** version is single layer shielded and uses AC power with an isolation voltage of 10 kV. This MV version can be used for isolated measurements up to 10 kV while being powered by AC power. When higher isolation is required, the MV version can be disconnected from the AC power and run from internal battery for 5 minutes. When it is reconnected to AC power, the internal battery will be recharged.

The **High Voltage (HV)** version is also single layer shielded and exclusively battery powered. The removable batteries run for a minimum of 24 hours, with a software controlled “sleep mode” that extends the standby time significantly. Hot swappable batteries (not when acquiring data, see ("Batteries" on page 15) allow for continuous deployment: while charging one set, the unit operates on a spare set. Standardized Lithium-Ion batteries are used to ensure proper operation in various environments.

A **system** always consists of one (or more) Isolated Digitizer transmitters and one (or more) receiver cards. One GEN series receiver card serves up to four transmitters.

3.1.2 Functional description

For each data channel the system has a front-end (the 6600 Isolated Digitizer), a twin fiberoptic link, data channel receiver and storage unit. The data channel receiver and storage unit is part of a GEN series four-channel receiver card.

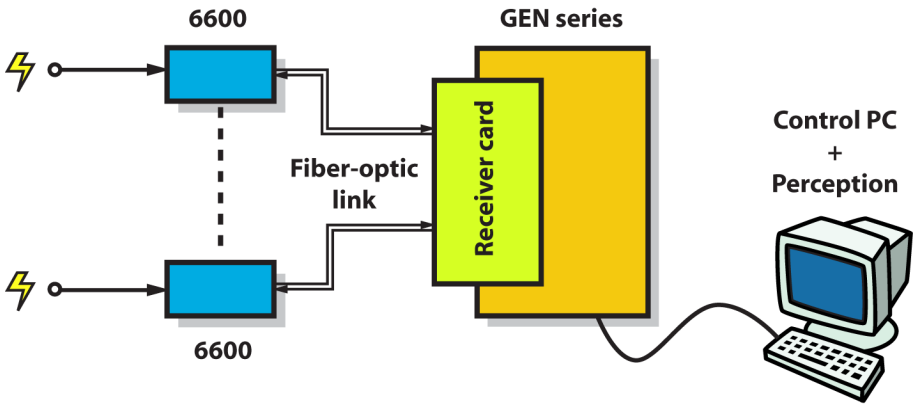


Figure 3.1: System block diagram

The front-end comprises a high-fidelity programmable amplifier with anti-aliasing (AA) filter, the A-to-D Converter, control logic, fiber-optic interfacing and a battery power management system.

The programmable amplifier has ranges from ± 20 mV to ± 100 V. The A-to-D Converter is available with a sample rate of 25 or 100 MegaSamples per second (40 ns and 10 ns time resolution) both with 14-bitaccuracy (0.006%).

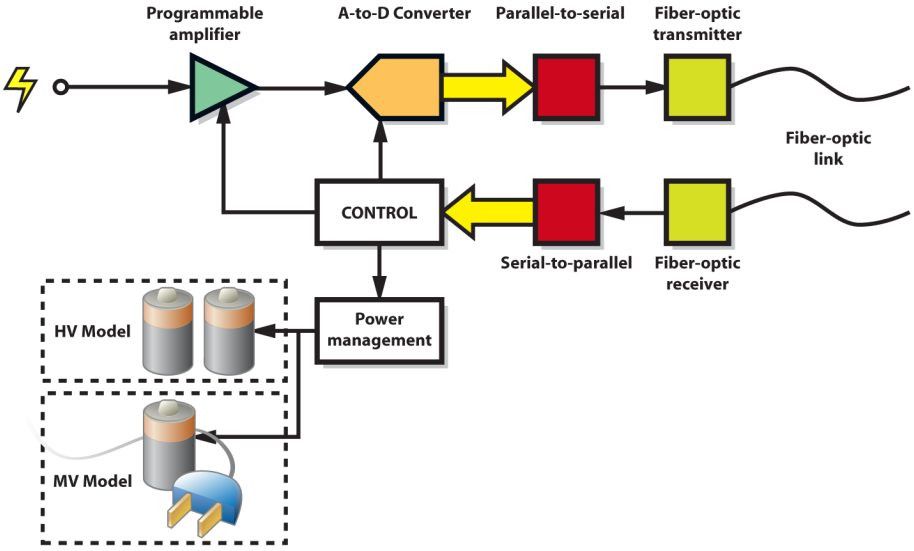


Figure 3.2: 6600 block diagram

Data emerging from the A-to-D Converter is serialized before transmission. Therefore only one fiber-optic cable is required for data transmission. This approach reduces cost and increases reliability and ease of handling.

The data-receiving end of the system consists of fiber-optic interfacing and de-serializing, digital trigger circuitry, buffer memory for local data storage and control logic. It provides all standard functions of a GEN series subsystem. The fiber-optic isolation is fully transparent to the user.

Special design ensures both short-term and long-term interchannel synchronization.

3.1.3 How to use this manual

This manual has been written to help you to benefit as fast as possible from the 6600 Isolated Digitizer and to get maximum results from its usage.

Many people read their user's manual only as a last resort. If you are one of those, the next paragraphs tell you where to find information when you need it.

IMPORTANT

READ THE NEXT SECTION EVEN IF YOU DON'T READ ANYTHING ELSE.

Safety Messages

Proper and safe use of this instrument depends on careful reading of all safety instructions and labels. Read the chapter "Safety Messages" on page 7 for details.

Installation and Operation

To know how to install this system in the correct way, read the installation section. We do not advise to install the system without reading this section. This section also describes how to use the subsystem, charge batteries, replace batteries, etc. Read the chapter "Installation and Operation" on page 36 for details.

Technical Reference

This section contains additional technical information pertinent to the 6600 Isolated Digitizer. Read the chapter "Technical Reference" for details.

3.1.4 Technical support

Contact your local dealer or HBM directly for technical support, general information and more. Refer to the back of this manual for address details.

4 Installation and Operation

4.1 Introduction

This section describes how to install and operate the 6600 Isolated Digitizer, which is the front-end (or transmitter) section. The receiver card(s) should already have been factory installed into the GEN series system.

4.1.1 Unpacking

For transportation the Isolated Digitizer is sealed in a polyethylene bag and cushioned in its box by shock-absorbent material. Accessories are separately sealed in polyethylene bags and included in the box.

4.1.2 Unpacking and inspection

Unpack the instrument carefully and examine it thoroughly to ascertain whether or not damage has occurred in transit. Report immediately any such damage to the agent or manufacturer.

Retain the packing materials and box for use if further transportation is necessary. Also be sure to keep all documents supplied with the instrument; some may be addenda or update bulletins applicable to the manual or instrument.

4.1.3 Equipment checklist

Check that the equipment contained in the transportation box complies with the packing list. It typically includes:

- 6600 Isolated Digitizer front-end.
- Optional connectors.
- Fiber-optic cables as ordered.
- User Manual that you are reading now.
- Charger (HV model only).
- Power cord (MV model only).
- Miscellaneous documents.

4.2 Connector locations

This section describes the location of the various connectors on the 6600 Isolated Digitizer front-end.

4.2.1 Front-end I/O connectors

Refer to the following diagrams for the position of the signal input and fiber-optic connectors on the front-end cabinets.

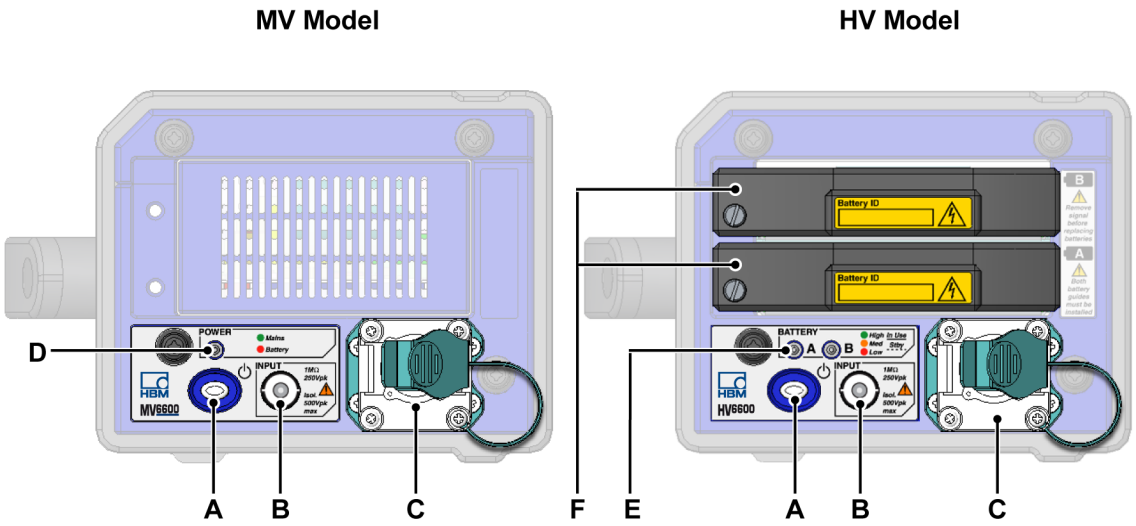


Figure 4.1: Front-end I/O connectors, switches and indicators

A Power standby switch

B Isolated signal input BNC connector

C Fiber-optic connector

D LED power status indicator

E LED battery status indicators

F Removable batteries

A - Power switch The power switch on the instrument is not a disconnecting device. When the instrument is connected to the mains or when batteries are installed, some power will be consumed. To disconnect the MV model from the AC supply, unplug the IEC connector on the rear of the instrument.

B - Signal input This BNC connector is the analog input connector. Connect the signal to be recorded to this plug. The BNC connector is isolated. For connection of a signal to the isolated BNC input of the instrument use isolated BNC connectors only.

C - Fiber-optic connector This connector is used in combination with a fiber-optic plug connector SCRJ (in accordance with IEC 61754-24), IP67, duplex, with quick connection method. As seen from the front, the left-most fiber-optic link transmits the data (Data Output) and the right-most fiber-optic link receives the commands (Command Input). Also fiber-optic plug connectors SCRJ-IP20 can be used.

The receiver side of the system is equipped with an LC duplex connector.

Figure 4.2: Example of a duplex SCRJ connectors (IP67 and IP20)

The optical link is used to transfer digitized data from the front-end to the receiver unit and to transfer control commands from the GEN series to the front-end.

D - LED Power status indicator This indicator shows the power status of the MV model:

- When OFF: system is switched off.
- When ON - GREEN: system is active and working from the mains power supply.
- When ON - RED: system is active and running on internal batteries.

When the LED is GREEN and BLINKING, the system is in use, but there is no valid communication between the front-end and the GEN series, e.g. the cable is not connected.

E - LED battery status indicators There are two LED indicators on the HV model, one for each battery. The LED's can have one of the following states:

- When OFF: system is switched off, or battery is not installed.
- When BLINKING: battery is not in use.
- When ON: battery is in use.

- When GREEN: battery capacity is high.
- When ORANGE: battery capacity is medium.
- When RED: battery capacity is low. You should replace the battery.

Any combination of ON/BLINKING and GREEN/ORANGE/RED is possible. E.g. an orange blinking LED indicates that the corresponding battery is not in use and has a medium capacity.

When both LED's are GREEN and BLINKING, the system is in use, but there is no valid communication between the front-end and the GEN series, e.g. the cable is not connected.

F - Removable batteries For more details refer to "Battery (re)placement (HV model only)" on page 45.

4.2.2 Front-end power connector

The AC power inlet of the MV model is located on the rear of the front-end cabinet.

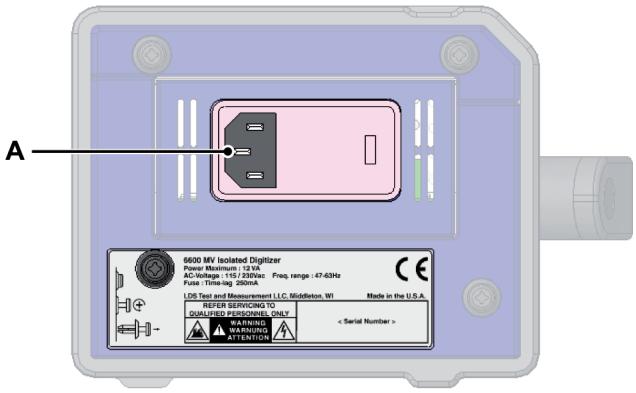


Figure 4.3: 6600 rear view with AC power inlet

A- Power inlet The power connection of the MV model is via a standard IEC 320 EN 60320 C14 (male) appliance inlet, 2-pole, 3-wire designed for 250 V @ 10A.

The MV model is delivered with a standard power cord that should be inserted into this socket and must be connected to a suitable AC power outlet. According to the standards utilized in your country, you may be required to purchase a different power cord.

To disconnect the instrument from the AC supply, unplug the IEC connector on the rear of the instrument. The instrument should be positioned to allow access to the AC connector. The front power switch on the instrument is not a disconnecting device. When the instrument is connected some power will be consumed.

4.2.3 Receiver connectors and indicators

The receiver is a card that is inserted in the GEN series Data Acquisition System. One receiver card serves up to four front-ends (transmitters).

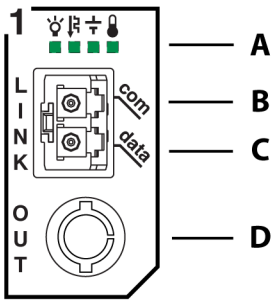


Figure 4.4: Receiver connectors and indicators of a single channel

A Status LED's

B Command output fiber-optic

C Data input fiber-optic

D Monitor output

A- Status LED's The LED indicators are used to give a visual indication of the fiber-link / front-end status.

The icon is used to identify the signal detect function. The icon is for Data/ Synchronization identification. The icon gives the status of the battery. The last icon, identifies the temperature status of the front-end. When the power of the mainframe is switched on, at least one LED should be illuminated.

The following table gives the function and possible combinations of the four LED's.

Table 4-1: Front panel LED indicators

FRONT PANEL LED INDICATORS				
Color				
Off	No power, or boot failure	No optical signal detected	No optical signal detected	No optical signal detected
Red	No optical signal detected	Not synchronized, no valid data	Battery power low No mains [MV]	Front-end temperature out of bounds
Orange	N/A	Synchronized, but no valid data	N/A	N/A
Green	Optical signal detected	Synchronized and valid data	Battery power OK mains OK [MV]	Front-end temperature within limits

Note: [MV] = MV model

B- Command output This connector provides the command and timing output and must be connected using fiber-optic cable with the “Optical Link - Command” connector on the frontend cabinet.

The Command Output and Data Input are combined in a dual LC® connector.

C- Data input This connector is the data input connector and must be connected using fiberoptic cable with the “Optical Link - Data” connector on the front-end cabinet.

The Command Output and Data Input are combined in a dual LC® connector.

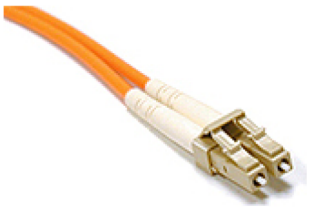


Figure 4.5: Example of a dual LC connector

D- Monitor output This is a BNC output. It provides a copy of the analog signal connected to the analog input connector on the front-end.

4.3 Installation

This section describes how to install and interconnect the various components.

4.3.1 Voltage selection and fuse replacement (MV model only)

The 6600 Isolated Digitizer MV model uses up to 12 VA and operates from line voltages of 115 Vac or 230 Vac at 47-63 Hz.

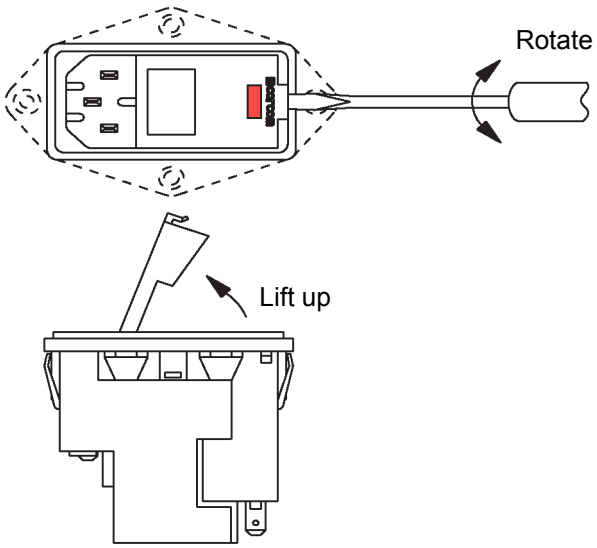
WARNING

Inspect the voltage selector at the rear of the front-end cabinet for the correct setting before applying power. If necessary see the section below for instructions on changing the voltage selector.

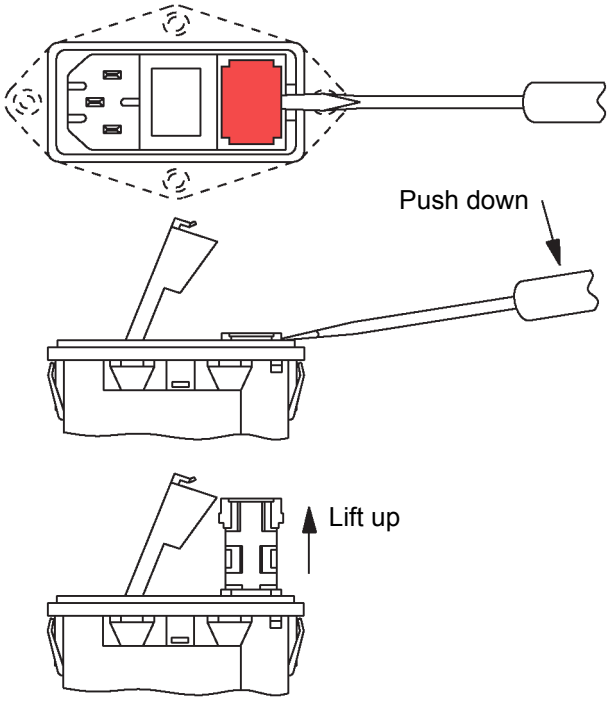
To gain access to the voltage selector and fuses proceed as follows:

1 Unplug the powercord.

2 Using a pocket screwdriver, insert the screwdriver in the slot under the door and gently rotate the screwdriver to unlatch the door. When unlatched, raise the door.



3 With the door in the raised position, apply the screwdriver at the slot in the end of the fuseholder and gently push down to raise the fuseholder and remove it from the housing.



Replacing the fuses
The fuseholder is equipped with two identical fuses.

WARNING

Replace both fuses at the same time with correct type and rating as indicated on the rear of the front-end cabinet and in this manual.

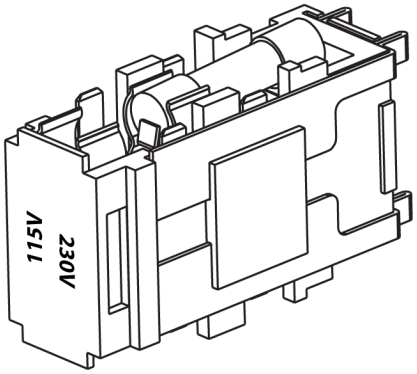


Figure 4.6: Fuseholder shown with 5x20 mm fuse

To replace the fuses proceed as follows:

1 Remove the fuses from their seating and replace when necessary.
2 When done re-insert the fuseholder and close the door.

Changing the voltage selection
To change the voltage selection do the following:

1 Turn the fuseholder.
2 Re-insert the fuseholder and close the door.
3 The correct voltage must now be visible from the outside of the power entry housing.

Re-insertion of the fuseholder should go smoothly. Do not use excessive force. Verify proper placement of fuses as well as the position of the unit if it won't snap into place easily.

4.3.2 Battery (re)placement (HV model only)

Before you can use the HV model, both battery modules must be installed. When batteries are low and need to be charged they must be removed.

WARNING

ELECTRICAL SHOCK HAZARD! Remove any input signal before proceeding.

To remove a battery module

To remove a battery module do the following:

1 Using a flat blade screwdriver loosen the multi-turn screw that holds the battery module.
2 Pull the battery module gently out of the cabinet.

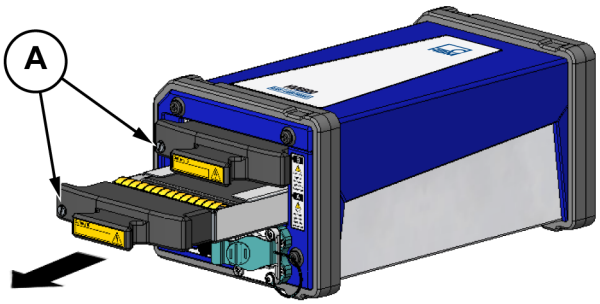


Figure 4.7: Battery module removal

A Screws

To place a battery module

To place a battery module proceed as follows:

1 Place the battery module in the cabinet.
2 Push it firmly into the connector in the rear of the cabinet until you feel it snap, without using excessive force.
3 Using a flat blade screwdriver fasten the multi-turn screw to hold the battery module in position.

Battery module

The battery module is a battery holder with a standard Lithium Ion battery. The batteries can be charged and discharged hundreds of time, but will gradually wear out. When the operation time is noticeable shorter than normal, it is time to renew batteries.

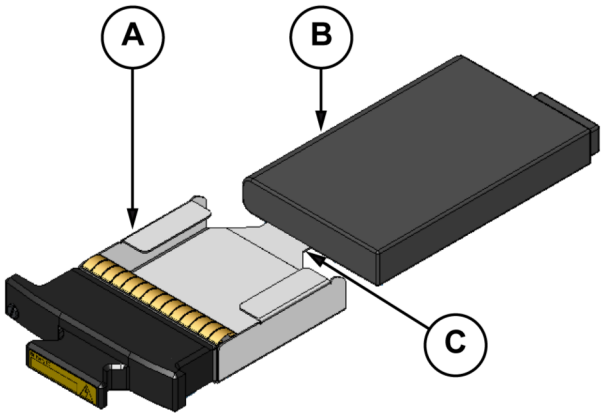


Figure 4.8: Battery module

A Battery holder

B Battery pack

C Lock strip

To renew a battery

To renew a battery in the battery module do the following:

1 Remove the battery module from the cabinet and place it on a flat surface.

2 Remove the battery from the battery holder:

- Gently bend down the strip that locks the battery into position until the battery is released.
- Pull the battery out of its seat.

3 Place a new battery in the holder.

The battery module is designed to fit in the battery charger, i.e. it is not necessary to remove the battery from the battery holder when charging the battery. However, when you are using a non-standard charger it may be necessary to remove the battery from the battery holder before you can place the battery in the charger.

4.3.3 System connections

Connect the front-end and the mainframe by means of a fiber-optic cable. The fiber-optic cable must be a dual-core cable. One side has a dual SCRJ connector, the other end has a dual LC connector. Cables supplied by HBM are already correctly configured.

Figure 4.9: Fiber-optic cable with LC (left) and SCRJ (right) connectors

Using the fiber-optic cable, connect the dual LC connector to the receiver card (select any of the four ports). The other end of the cable with the SCRJ connector goes to the front-end.

LC connector
Insert the plug into the receiver. Refer to for details. Make sure the lock mechanism is positioned to the right. You hear a ´click´ when the lock mechanism locks the cable. To disconnect the LC connector, push the lock mechanism and gently pull the connector out of the port on the receiver. Do not use excessive force to pull out the plug.

SCRJ connector
Insert the plug into the front-end. Refer to for details. On the connector there is a notch. Make sure the notch is pointing downwards. You hear a ´click´ when the lock mechanism locks the cable.

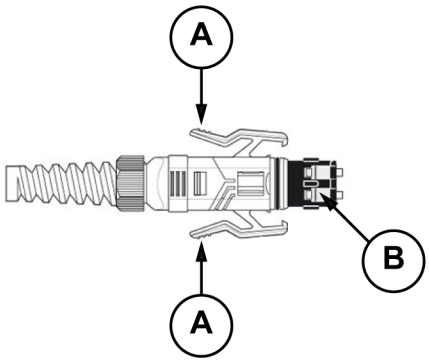


Figure 4.10: SCRJ connector latches and notch

A Press latches to release connector

B Notch

To disconnect the SCRJ connector, press both latches and pull the connector out of the port on the front-end.

Insertion and removal of the SCRJ connector require some force.

When you are using your own fiber-optic cables make sure that the COMMAND and DATA lines are connected correctly: command-out of the receiver to the command-in of the front-end; data-out of the front-end to the data-in of the receiver.

4.3.4 Initial check-out

For an initial check-out of the system verify as follows:

- HV Model: make sure that both batteries are in place and charged.
- MV Model: make sure the voltage selector is set to the correct voltage and the power cord is connected.
- Check the fiber-optic cabling between the front-end and the receiver card in the GEN series mainframe.
- Is the mainframe installed properly: fuses, power selection, power cord connected?

Now you can switch on the GEN series mainframe and the front-end(s).

The LED's on the front panel of the fiber-optic receiver card must indicate that both connection and battery are OK for each channel installed and connected.

This completes the installation. Refer to the GEN series User Manual for more hardware information and to the Perception User Manual for software information.

5 Technical Reference

5.1 Introduction

This section contains additional technical information pertinent to the 6600 Isolated Digitizer and its usage.

5.1.1 Battery charging

Design and construction of the front-end/battery combination are such as to provide for a 24- hour continuous operation (5 minutes for the MV Model).

5.1.2 MV Model

The internal battery of the MV Model is automatically recharged when the front-end is connected to the mains, also when the system is in operation.

5.1.3 HV model

To recharge the batteries of the 6600 HV model you need a suitable charger. HBM provides chargers that are targeted towards the delivered batteries.

Figure 5.1: Example of a battery charger

To charge a battery

To (re)charge a battery proceed as follows:

1 Remove all cables from the 6600 Isolated digitizer.

2 Remove the battery as described in “To remove a battery module” on page 45.

3 Place the battery or batteries in the charger:

- Refer to the documentation that came with your charger for additional information.
- Depending on the charger in use, the complete battery module may not fit in the charger. If so, remove the battery pack from the battery holder as described “To renew a battery” on page 47.

4 When the battery is fully loaded replace the battery as described in "To place a battery module" on page 46.

Requirements
Recharging the battery requires a typical charge current of 2.8 Amps (4.0 Amps maximum) and a voltage of 12.6 Volts (@ 20 ˚C).

When the battery is fully exhausted, it will take 2.5 hours to reach the 100% capacity again (at the typical charge rate). In practice however, the battery will not be fully exhausted, reducing the recharge time.

Battery low vs. recharge
The "battery low" indication on the receiver front panel becomes active when the battery voltage has gone below the 10.5 V level, and stays active until the 9.0 V level is reached. After this the front-end will not function any more.

5.2 Power management considerations

The following guidelines apply for optimum battery usage.

- A Li-ion battery typically provides 300-500 discharge/charge cycles.
- The battery prefers a partial rather than a full discharge. Frequent full discharges should be avoided when possible. Instead, charge the battery more often, except before a long storage. There is no concern of memory when applying unscheduled charges, the Li-ion battery does not suffer from the "memory effect" at all.
- Keep the Li-ion battery cool. Prevent storage in a hot car. Never freeze a battery.
- Store the battery at a 40 percent charge level. Never fully charge or discharge the battery before storage. The 40 percent charge assures a stable condition even if self-discharge robs some of the battery's energy. Most battery manufacturers store Li-ion batteries at 15 °C (59 °F) and at 40 percent charge.
- Avoid purchasing spare Li-ion batteries for later use. Observe manufacturing date when purchasing. Do not buy old stock, even if sold at clearance prices.
- Contact your battery supplier / manufacturer (or visit their web site) for more details on battery specifications, usage and maintenance.

5.3 Shunt measurements

Special care must be taken with shunt measurements. Typical shunt measurements generate signals with an amplitude of only a few volts. To prevent interference from higher voltage signals (up to 100 volt) the following guidelines apply:

- Use only coaxial cable for all measurements.
- When possible place the 6600 Isolated Digitizer front-end as close as possible to the test object to reduce the length of the coax cable.
- Physically separate low voltage signal lines and high voltage signal lines as much as possible. Do not combine them. When the higher voltage signals include high frequency transients these will easily cross over to the low voltage signals.

CAUTION

Keep in mind that very strong magnetic fields can influence the amplifier setting relays!

Note that the 6600 Isolated Digitizer has a relatively high bandwidth of 25 MHz (100 MS/s model). As a result of this high bandwidth you may see high frequency transients that you have never seen before. Use the filter to reduce the bandwidth to a physical relevant value.

5.4 Connectors

The following connector types are used.

MV Model input connectors	
Analog input	Isolated BNC
Fiber optic link	Female insert SCRJ, duplex, with protective cover for SCRJ-IP67 plug connector in accordance with IEC 61754-24

HV Model input connectors	
Analog input	Isolated BNC
Fiber optic link	Female insert SCRJ, duplex, with protective cover for SCRJ-IP67 plug connector in accordance with IEC 61754-24

GEN series receiver card	
Fiber optic link	LC duplex

A Specifications

A.1 General

The 6600 Isolated Digitizer is available in four different configurations. There are two mechanical variants, one for use in medium and one for use in high voltage environments: MV Model and HV Model.

Each model is available with **25 MS/s** or **100 MS/s** digitizing speed.

A.2 Front-end specifications

Analog input section

Channels	1 per front-end
Input type	Single-ended to isolated common (unbalanced differential)
Coupling	AC / DC / GND
Connector	Fully isolated BNC
Ranges	± 20 mV to ± 100 V Full Scale in 1, 2, 5 steps
Zero suppression	Automatic, equal to range
Impedance	1 MΩ (± 2 %) // 38 pF (± 5 %)
Bandwidth	**100 MS/s:** 25 MHz @ – 3 dB **25 MS/s:** 5 MHz @ – 3 dB
CMRR	100 dB @ 80 Hz
MSE	0.1 % FS ± 50 µV RTI
Offset error	0.1 % FS ± 50 µV RTI
Noise (RMS)	0.05 % FS ± 0.1 mV RTI
Bias current	< 2 nA
Rise time	**100 MS/s:** 14 ns @ 25 MHz **25 MS/s:** 75 ns @ 5 MHz
Recovery time	≤ 10 ns to 10 % following a 200 % Full Scale input ≤ 10 ns to 10 % following a 200 % Full Scale input ≤ 10 ns to 10 % following a 200 % Full Scale input ≤ 10 ns to 10 % following a 200 % Full Scale input
Isolation	500 Vpeak
Overload	250 Vpeak protected for ranges ≥ ± 2 V 125 Vpeakprotected for ranges < ± 2 V 800 Vpeak transient (impulse spark-over voltage at 1 kV/µs)
Anti-alias filter	6th order Bessel low-pass: **100 MS/s:** 10 MHz **25 MS/s:** 5 MHz

Digitizer section

Conversion	Single A-to-D Converter per channel Synchronous sampling between channels
Conversion rate	25 or 100 MegaSamples per second
Resolution	14 bit (0.006 %) 16 bit in enhanced mode
Aperture jitter	200 fs

Fiber-optic link	
Light source	Class 1 laser product
Connector	Female insert SCRJ, duplex, with protective cover for SCRJ-IP67 or SCRJ-IP20 plug connector in accordance with IEC 61754-24
Transfer rate	2 Gbit/s
Wavelength	850 nm
Cable type	Multimode 50/125 µm
Dynamic range	+ 9 dB
Isolation	10^{15} Ω/meter
Cable length	Contact factory for availability
Maximum length	800 m using a single cable Maximum length will decrease by 100 m for each patch panel installed

Batteries	
Type	**MV Model:** internal, rechargeable, NiMH 12 V @ 300 mAh **HV Model:** 2x removable, rechargeable, Li-ion 11.1 V @ 6600 mAh Smart Battery 1.1 compliant
Operation time	**MV Model:** 5 minutes (fresh, fully loaded batteries) **HV Model:** 24 hours
Recharge	**MV Model:** built-in charger **HV Model:** 12.6 V DC, 2.5 to 4 Amp @ 25 °C (77 °F)

AC Power (MV Model only)	
Power	115 / 230 VAC @ 47-63 Hz, 12 VA maximum

All specifications are typical @ 25 °C (77 °F) unless otherwise stated and subject to change without notice in order to improve design- and/or performance characteristics.

Consult www.hbm.com/highspeed for more information.

A.3 Receiver specifications

A single GEN series receiver card serves up to four 6600 Isolated Digitizer front-ends.

For detailed information on the GEN series system refer to the " GEN series Data Acquisition User Manual".

Fiber-optic link	
Light source	Class 1 laser product
Connector	LC Duplex
Transfer rate	2 Gbit/s
Wavelength	850 nm
Cable type	Multimode 50/125 µm
Dynamic range	+ 9 dB
Isolation	10^{15} Ω/meter
Cable length	Contact factory for availability
Maximum length	800 m using a single cable Maximum length will decrease by 100 m for each patch panel installed

Filtering	
Digital filters	**100 MS/s model:** Sample rate fs = 100 MS/s: no filter Sample rate fs < 100 MS/s: user selectable in range 5 MHz to 50 kHz in 12 steps **25 MS/s model:** User selectable in range 5 MHz to 50 kHz in 12 steps

Monitor output	
Outputs	one BNC per channel on receiver front panel
Output level	± 5 V Full Scale, uncalibrated
Output current	± 20 mA
Output load	> 250 Ω
Conversion	Single D-to-A Converter per channel
Conversion rate	100 MS/s
Resolution	14 bit (0.006 %)
Output filter	6-pole Bessel, 10 MHz @ – 3 dB
Delay	Delay from input to output: Minimum: < 1 µs (filter = wideband) Maximum: 12 µs (filter = 50 kHz)

Transient memory	
Capacity	On board 400 MegaSample (800 MegaByte) total, to be used by enabled channels
Triggering	
Type	Dual-level trigger digital trigger detector per channel
Pre/post trigger	Pre- and post trigger segment can be zero samples up to full memory length
Rate	Pre- and post trigger segment can be zero samples up to full memory length
Resolution	16 bit (0.0015 %) on each level
Acquisition modes	
Recorder	for continuous acquisition
Scope	for repetitive phenomena
Transient	for intermittent events; single, dual or A-B-A timebase
Data storage	
Recorder	Spooled directly to harddisk of control PC Unlimited file size or duration Maximum transfer rate: 5 MS/s per channel
Scope	Store in transient memory
Transient	Store in transient memory; single or A-B-A timebase

All specifications are typical @ 25 °C (77 °F) unless otherwise stated and subject to change without notice in order to improve design- and/or performance characteristics.

Consult www.hbm.com/highspeed for more information.

A.4 Physical and environmental

Physical and environmental specifications

Dimensions	Width x Depth x Height, including handles, etc. **MV Model:** 175 x 265 x 119 mm (6.86 x 10.44 x 4.69 inch) **HV Model:** 175 x 280 x 119 mm (6.86 x 11.3 x 4.69 inch)
Weight	**MV Model:** 3 kg (6.6 lb.) maximum **HV Model:** 4 kg (8.8 lb.) maximum including batteries
Shielding	Single metal shielding in plastic housing Correct operation has been verified by placing the front-end cabinet within 1 meter of an EMC field created by a 80 kA current
Power supply	**MV Model:** 115/230 VAC, 47-63 Hz, 12 VA or internal battery **HV Model:** internal, removable batteries
Isolation	**MV Model:** isolation when AC powered 10 kV **HV Model:** N/A
Operating temp.	**MV Model:** 0 ˚C to +40 ˚C (+32 ˚F to +104 ˚F) **HV Model:** –15 ˚C to +50 ˚C (+5 ˚F to +122 ˚F)

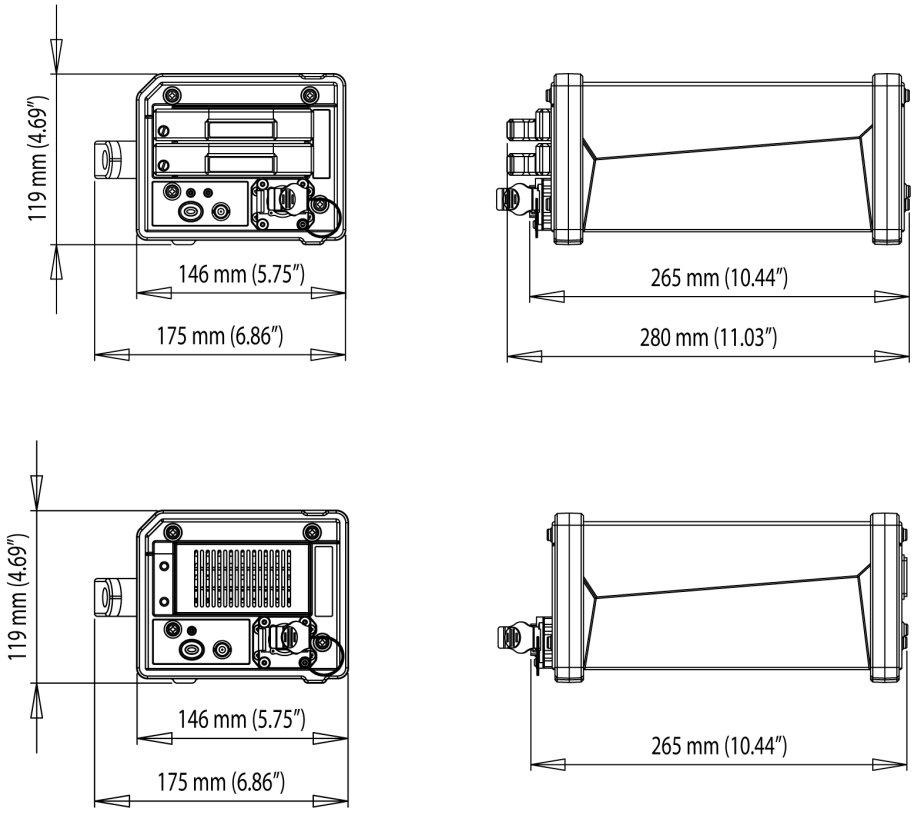


Figure A1: Dimensions HV Model (top) and MV Model (bottom) front-ends

All specifications are typical @ 25 °C (77 °F) unless otherwise stated and subject to change without notice in order to improve design- and/or performance characteristics.

Consult www.hbm.com/highspeed for more information.

B Maintenance

B.1 Cleaning

To clean the instrument, disconnect all power sources and wipe the surfaces lightly with a clean, soft cloth dampened with water.

The 6600 Isolated Digitizer front-end cabinet does not require additional routine cleaning.

C Service Information

C.1 General

HBM offers comprehensive factory servicing for all HBM Data Acquisition products. Extended warranties for calibration, repair or both are available. Installation, on-site or factory training are also available. Contact the factory or your local sales person for more information. For local contact information, visit www.hbm.com/highspeed.

If servicing is ever needed on your 6600 Isolated Digitizer, contact the factory with the model and serial numbers, a description of the problem, and your contact information. You will be issued a Return Material Authorization (RMA) number. Attach this number to the unit and/or the accompanying paperwork.

During the warranty period, the customer pays for shipping to HBM. HBM will pay for the return of the equipment in the same fashion as it was received. Outside the warranty period, a quote will be given. A purchase order must be received before work can be performed.

It is recommended that the unit always be shipped in the original shipping container.

C.2 Calibration / verification

The 6600 Isolated Digitizer is factory calibrated as delivered to the customer. The 6600 Isolated Digitizer should be tested and if necessary, calibrated, at one year intervals or after any major event that may effect calibration. When in doubt consult your local supplier.

The 6600 Isolated Digitizer front-end and receiver are calibrated independently. Therefore any combination of front-end and receiver will give the listed specifications.

D Quadrature Encoder Model

D.1 General

A rotary encoder, also called a shaft encoder, is an electro-mechanical device used to convert the angular position of a shaft or axle to a digital code, making it a sort of transducer.

The absolute type rotary encoder produces a unique digital code for each distinct angle of the shaft.

The relative rotary encoder (also called incremental encoder) is used when absolute encoding methods would be too cumbersome, mainly due to the size of the patterned disc that is required.

The relative rotary encoder, in its simplest form, cannot measure the absolute angle of the shaft. It can only measure the change in angle relative to some arbitrary datum, such as shaft's position at the time when the power was switched on.

The second problem with this system is that it cannot tell which direction the shaft is rotating in. To overcome this problem, two sensors are used. This type of encoder is known as a **quadrature encoder**.

D.2 Introduction

HBM engineered a special version of the 6600 Isolated Digitizer, labelled the 6610 HV model, that provides interfacing to quadrature encoder inputs. The 6610 HV model can be used as any other 6600 model. The output provided is a linear representation of counted values.

Features include:

- Differential RS-422 input.
- Input overvoltage clamping 6.2 V @ 6.5 A (40 VA) peak 100 µs max.
- Input overvoltage clamping 6.2 V @ 50 mA (300 mVA) continuous.
- 100 kHz input signal maximum per input.
- 16-bit signed integer counter: –32768 to + 32767
- Additional 5V @ 400 mA output on connector

D.2.1 Operation

The 6610 HV Model requires two clock input signals labelled CLOCK1 and CLOCK2. These input signals drive the counter:

- The counter is incremented when a rising edge of CLOCK1 occurs when CLOCK2 is low.
- The counter is decremented when a rising edge of CLOCK2 occurs when CLOCK1 is low.
- The falling edge of a clock signal enables the single edge detect of the other clock signal.

For a correct determination of the absolute position, i.e. the relative position referenced to a known position, the counter must be reset. This is typically done before an acquisition/ recording is made.

To reset the counter

To reset the counter do the following:

1. Make sure all systems are on-line.
2. In the **Perception** software go to the **Settings** sheet.
3. In the settings sheet go to the **Input** section and click on **Basic / Voltage**.
4. In the settings sheet locate the channel(s) that you want to reset.
5. In the **Input Coupling** column select **GND**. This will reset the counter(s).
6. In the **Input Coupling** column select **DC**. This will enable the counter(s).

When a recording is finished, the resulting waveform values represent the position.

Usually there is no linear relation between the counter values and the actual position. Therefore the Perception software has an option in the formula database that allows you to convert the measured values into a meaningful result using a linearization table.

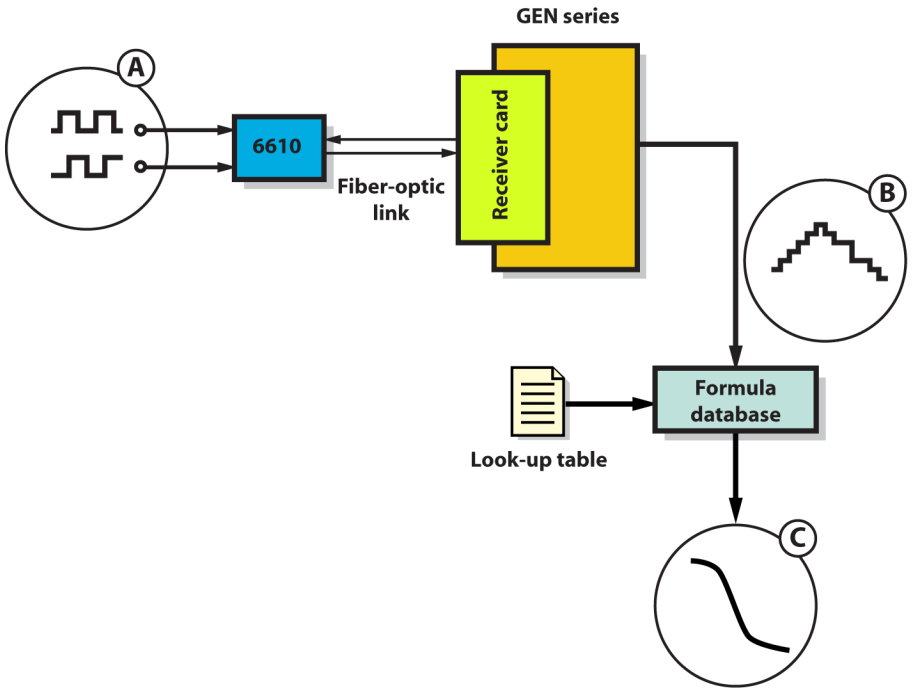


Figure D1: Schematic diagram of linearization

A Quadrature input signals

B Counter output

C Converted waveform

For this to work you will need to create a look-up table, stored in an ASCII file. This file is the Conversion Look Up Table (CLUT). Each line in this file contains a floating point number.

Once you have created the file you must use the function **@IntLookUp()** in the formula database. This function uses the data from a waveform as a indices to a CLUT. Each value of the original waveform is used as a pointer into the CLUT. The corresponding value in the CLUT is used to produce the output. This function requires the following parameters:

- Input waveform: the counter output waveform
- File name: the name of the ASCII file that holds the look-up table
- Optional offset within the look-up table

The first line is associated default with index 0. An index offset is used for negative numbers in the input waveform.

For signed integers use an offset of 32768. By doing so the first point in the CLUT is associated with –32768.

Example: **result = @IntLookUp(Active.Group1.Recorder1.Ch1;”LookUp.asc”;32768)**

Refer to the Perception manual for more details on how to use the formula database.

D.3 Front-end I/O connectors

Refer to the following diagram for the position of the signal input and fiber-optic connector on the 6610 HV front-end cabinet.

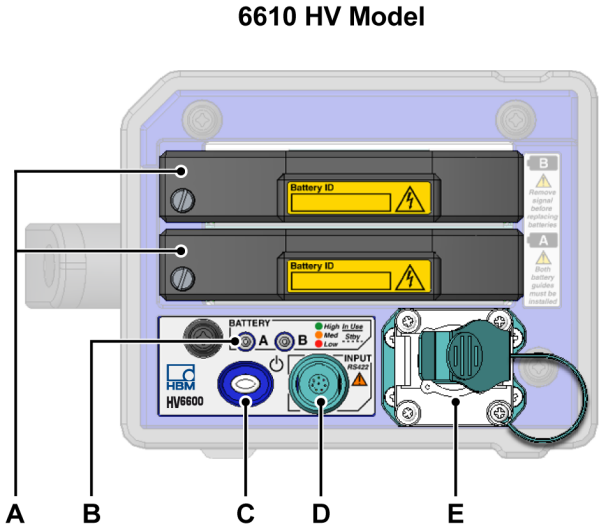


Figure D2: Front-end I/O connectors, switch and indicators

A Removable batteries

B LED battery status indicators

C Power standby switch

D RS-422 signal input connector

E Fiber-optic connector

Refer to "Connector locations" on page 37 for details on the standard components

D.3.1 Input connector

The input connector used is a LEMO Redel P Series 8-pole socket: **PKG.M0.8GL.LG** with the following pinning:

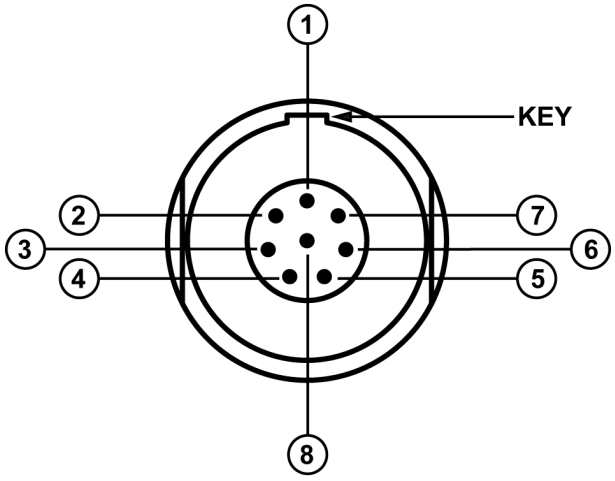


Figure D3: RS-422 Input connector pinning (front view)

1 CLOCK1 + (positive)

2 CLOCK1 – (negative)

3 CLOCK2 + (positive)

4 CLOCK2 – (negative)

5 +5 Volt output

6 Not connected

7 Not connected

8 Ground

The key (female) is used for proper insertion and positioning of the connector.

E Using Patch Panels

E.1 General

Patch panels are switchboard look-alikes that house cable connections. In a typical setup, the connection consists of a shorter cable plugged into the front side of the patch panel and a longer cable plugged into the back.

In addition to having different lengths of cable connecting to the front and back, patch panels can have different types of electrical connectors as well. One example of this is a breakout box, which has individual connectors on the front leading to a compound connector on the back, into which all of the individual cables plug. In all cases, patch panels transmit signals from one cable to another without any loss of data.

Another function is the ability to change and interchange the individual cables on the front. Patch panels have compound connectors on the back side that don't differentiate which signal is coming from which individual port.

A patch panel provides a convenient place to terminate all of the cable runs coming from different locations into the laboratory. You can label the patch panel. Putting the labels on the cables is tougher to read than labels on a patch panel and also there is risk of having the cable labels fall off.

E.2 Patch panel configuration

Below is an example of a possible patch panel configuration.

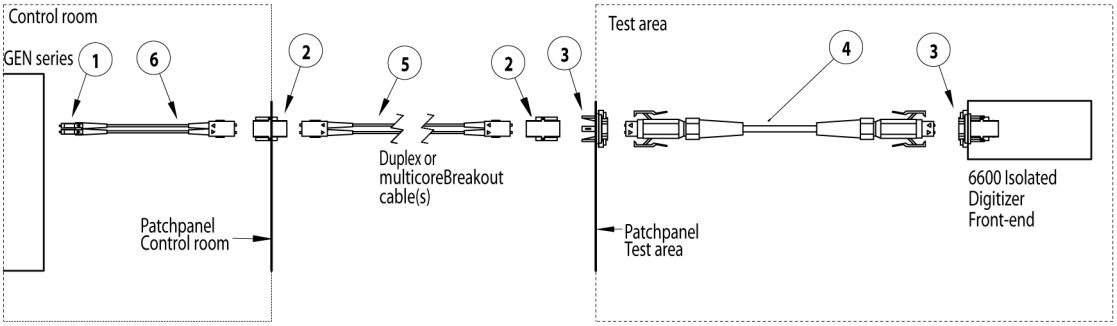


Figure E1: Example of a patch panel configuration

1 Fiber-Optic LC connector plug

2 Fiber-Optic coupler SCRJ/SCRJ

3 Fiber-Optic SCRJ-IP67 connector

4 Fiber-Optic cable SCRJ-IP67 to SCRJ-IP67 (optional SCRJ-IP20 to SCRJ-IP20)

5 Fiber-Optic cable SCRJ-IP20 to SCRJ-IP20

6 Fiber-Optic cable LC to SCRJ-IP20

Depending on the cables you use the actual configuration may differ from the situation depicted in the above diagram.

Note that the maximum cable length will decrease by 100 m for each patch panel installed. See "Front-end specifications" on page 57 for details.

Contact your local dealer or HBM directly for details on availability of connectors and cables.

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